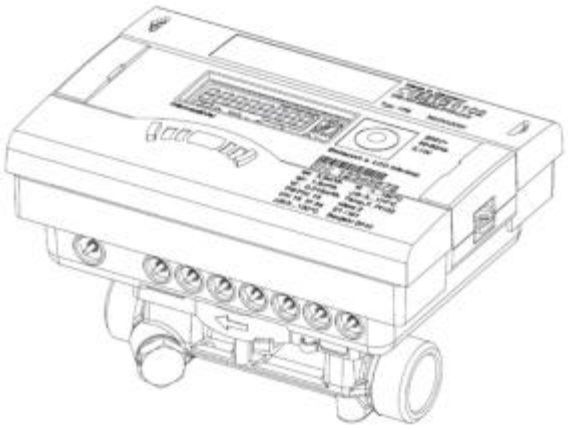


INSTRUCTIONS
FOR INSTALLING AND USING

F96 Plus ultrasonic heat meter

January 2013

Please ensure that this document is handed to the end user

F96 Plus ultrasonic heat meter

1. General
This installation guide is intended for trained personnel and does not contain any basic working information.

A comprehensive Installation and User Guide is available on-line at www.diehl-metering.de

Important
The seal on the energy meter must not be damaged. A damaged seal will result in the immediate invalidation of the factory warranty and verification. The cables supplied with the meter must not be shortened or changed in any other way.

Notes
The regulations concerning the use of energy meters must be observed. The meter installation should only be performed by an installer and/or electrical contractor using personnel trained in the installation and use of electrical equipment and who are familiar with the Low Voltage Directive.

Medium: Water as per AGFW instruction sheet FW510.
The specified medium temperature is 5 to 130°C (150°C if water additives are used e.g. corrosion protection). The user must ensure that the corrosion resistance is adequate. The temperature range depends on the variant and nominal size. The exact temperature range is shown on the type plate. The encapsulated variant is to be used if condensation is expected. The specified operating/ambient conditions are 5 to 55°C; IP54/64; 93% relative humidity.

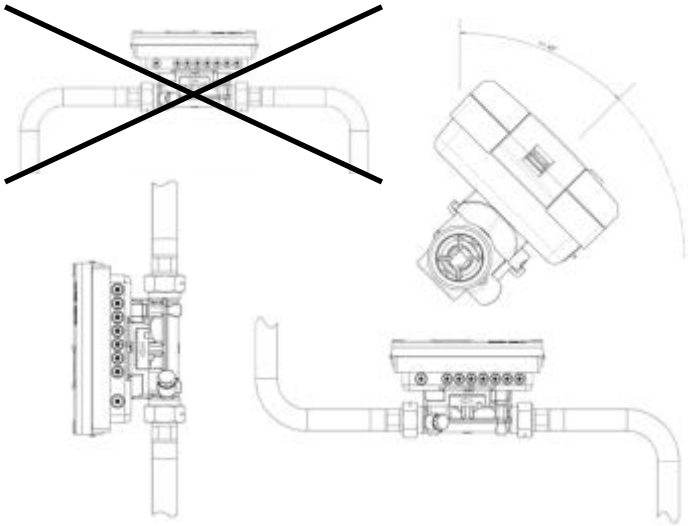
Further details about the variants can be obtained from the comprehensive user and installation guide. Compliance with this guide is essential.

The IZAR@SET software is used for read out/parametrization and is available on-line at www.diehl-metering.de.

2. Installation of Energy Meter

Depending on the design and application (heat or cooling meter), the energy meter is installed in either the hot or cold line of the system. The programmed installation location is shown in the information loop. The flow sensor must be installed so that the flow direction corresponds to the direction of the arrow on the sensor. Calming sections are not necessary before and after the flow sensor, **but calming sections of 3xDN are recommended before the meter**. The meter can be installed in both horizontal and vertical pipe sections provided that air bubbles cannot collect in the meter. The flow sensor must always be filled with liquid.

We recommend installing the flow sensor in a tilted position. The minimum system pressure must be 1 bar to avoid cavitation.



Ensure that the meter is installed sufficiently far away from possible sources of electro-magnetic interference (switches, electrical motors, fluorescent lamps etc).

For medium temperatures of 90°C or more, or if $T_{water} < T_{ambient}$ (for application as a cooling meter or heat meter with cooling tariff), the integrator must be removed from the meter and installed a sufficient distance away from heat sources. A wall holder (supplied with the meter) or a spacer holder (optional) is available for this purpose.

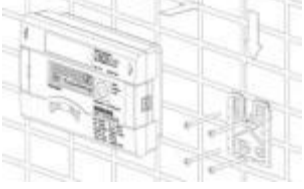
It is recommended that stop valves be fitted before and after the energy meter to simplify removing the meter.

The meter should also be installed in a conveniently accessible position for service and operating personnel. Initial operation is to be carried out and recorded after installation.

T: 5 … 90 °C
$T_{water} > T_{ambient}$

T: 5 … 130 °C/150 °C
$T_{water} < T_{ambient}$

Spacer holder



Wall mounting

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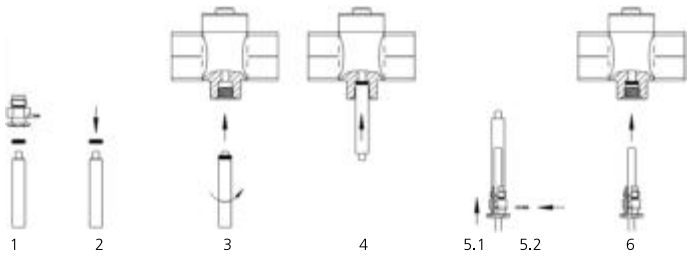
3. Installation of temperature sensors

Handle the temperature sensors carefully. The sensor cables are fitted with coloured type labels.
RED: sensor in hot line. BLUE: sensor in cold line.

Make sure the sensors are mounted symmetrically. The maximum cable length for PT100 and PT500 is 10 metres. The connecting cables must not be shortened or extended. For DN15 and DN20, the sensors must be installed or directly immersed. The free temperature sensor can be installed in a ball valve or in a conformity-tested pocket for this type of sensor. Ensure that the temperature sensors are permanently connected during operation.



If the sensor is installed in a pocket, it must be inserted as far as the bottom of the pocket and then secured.

For installation in a ball valve, a 4 piece coupling set is enclosed in a separate bag. See procedure under 1..6 below.

Insert one “O” ring in the sensor hole using the mounting pin supplied. Only tighten the brass or plastic screw by hand (2-3Nm); **tighten the plug screw with a torque of approximately 12Nm.**

4. Power Supply
4.1 Battery

A 3.6V DC lithium battery is fitted in the standard version. The battery is not to be charged or short circuited. Ambient temperature below 40°C extend the life of the battery. Used batteries must be disposed of at a suitable waste collection point. There is a risk of explosion if the battery is replaced by an incorrect type.

4.2 Mains unit

24V AC or 230V AC mains unit (protection class 1) can be changed or retrofitted at any time. The protective safety cover must be installed at all times. Never connect between two phases as this would destroy the mains unit. The cable is to be fused at a maximum 6 amps and protected against manipulation.

The mains unit notifies the meter if mains voltage is present. If the mains should fail, the backup battery (CR2032) in the mains unit provides the power supply for up to one year. The LCD readings (on pressing button) and the date and time are still updated, but none of the measuring functions work, including the flow rate measurement. Communication still functions over the optional M-Bus, RS485 and RS232 modules or the optical interface, but reduces the life of the backup battery. The radio function is switched off in the case of mains failure.

5. Taking into operation

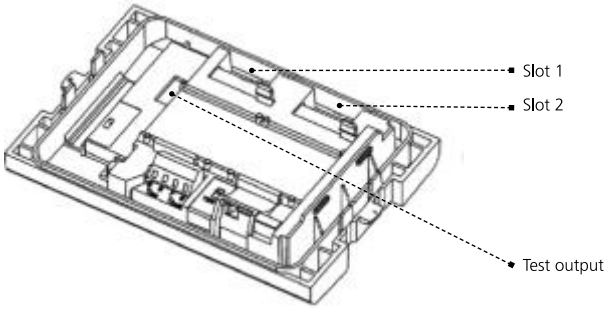
Once the meter has been installed, the components (integrator, volume measuring component and both temperature sensors) must be sealed and the meter taken into operation. Check the display for a plausible indication of flow rate and temperatures. Further information can be obtained from the Installation and User Guide, **www.diehl-metering.de**.

6. Extension modules

The energy meter has two slots for extension modules. They can be mixed at random, but two pulse modules of the same kind must not be installed. The analogue module occupies both positions. These modules have no effect on consumption recording and can be fitted retrospectively without damaging the verification mark. The relevant ESD regulations (electrostatic discharge) must be observed. No liability is accepted for damage (especially to electronic circuits) resulting from failure to comply with the ESD regulations.

F96 Plus ultrasonic heat meter

6.1 Installation of modules



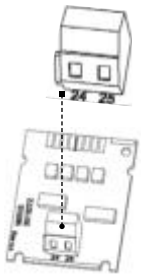
1. Open the integrator by releasing the side catches.
2. Engage the module in the relevant slot and carefully connect the pre-formed ribbon cable at both ends.
3. Close the lid and check the meter for correct operation by pressing the push button. Renew the seal of the housing lid if the meter functions correctly.

6.2 Communication modules

The integrator supports three communication channels. Two additional communication modules can be used in wireless operation, e.g. two M-Bus modules. The protocol differs for each of the two channels and is preset ex-works with telegram 2 identical to the radio telegram, but can be set to customer-specific requirements using the IZAR@SET software. Each channel has its own primary address. Both ports have a common secondary address, which is set to the serial number ex-works.

6.2.1 M-Bus

The M-Bus communication module is a serial interface for communication with external devices (M-Bus control centre), eg. IZAR CENTRE. A number of meters can be connected to a control centre. The module contains a 2-pole terminal strip with terminals marked 24, 25.



- The connection is not polarity-conscious and is electrically isolated.
- M-Bus protocol to EN 1434-3 standard
- 300 or 2400 baud (auto baud detect)
- Connection for 2 x 2.5mm² wires
- Current drawn; **one** M-Bus load

6.2.2 Communication over radio

The integrated radio module is an interface for communication with Hydrometer radio receivers.

- Unidirectional communication has the following specification
- The module sends every 8...256s (send period 0.1% of duty cycle (min. 8s); variable, depending on protocol length and programming)
- The radio module always accesses the current meter registers
- Transmission frequency; 868 MHz or 434 MHz
- Various Hydrometer receivers are available for receiving the protocol (eg. Bluetooth, GPRS, LAN etc)
- The protocol conforms to the Open Metering or HYD standard and is encrypted

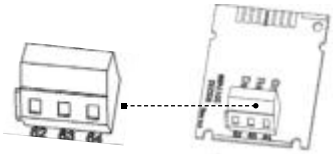
For problematic radio installations (shield) the external radio module set can be used.

6.2.3 RS232 communication module

The RS232 communication module is a serial interface for communication with external devices, eg. PC; 300 or 2400 baud.

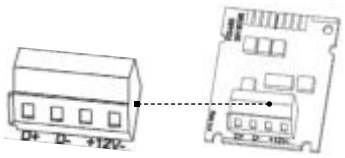
The module contains a 3-pole terminal strip with terminals marked 62(Dat), 63(Req) and 64(GND). A special adapter cable is required for connection (order no 087H0121). The coloured wires are to be connected as shown.

62 = brown
63 = white
64 = green



6.2.4 RS485 communication module

The RS485 communication module is a serial interface for communication with external devices, eg. PC; 2400 baud only.

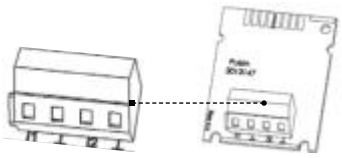


The module contains a 4-pole terminal strip with terminals marked D+, D-, +12V and GND. The module needs an external power supply of 12V DC ±5V.

6.3 Pulse input function module

Module for two additional pulse counters.

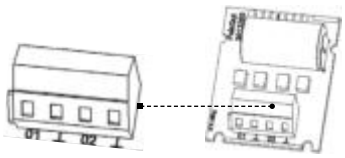
- Pulse input 1 is marked as "|1 -⊥" and input 2 as "|2 -⊥".
- 1, 2.5, 10. 25, 100, 250, 1000, 2500 litres per pulse



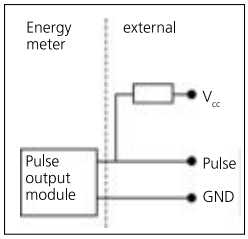
Pulse inputs are programmable (IZAR@SET) for a value of:

- Pulse transmitter must be electrically isolated eg. Reed contact
- Possible units are all the energy units available in the meter, the volume unit m^3 or no unit
- Input frequency is in the range ≤8 Hz; min. pulse duration 10ms
- Input resistance 2.2 MΩ; terminal voltage 3V DC
- Data is accumulated separately in registers
- Data is readable as IN1 and IN2 in the display and can be transmitted over the communication modules
- Cable length up to 10 metres

6.4 Pulse output function module



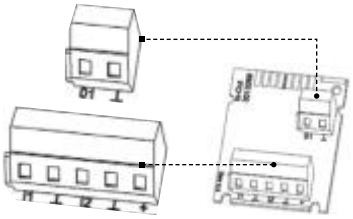
The module contains connections for 2 pulse outputs, which can be programmed as desired using the IZAR@SET software. The outputs are marked on the terminal strip as "O1 -⊥" and "O2 -⊥" and in the display Out1 and Out2.



- External supply: Vcc=3-30V DC
- Output current: ≤20mA with a residual voltage of ≤0.5V
- Open collector: (drain)
- Electrically isolated
- Output 1: f ≤ 4Hz
- Pulse duration: 125ms ±10%
- Pulse break: ≤125ms -10%
- Ouput 2: f ≤ 100Hz Pulse duration/pulse break ~ 1:1
- Volume pulse value is programmable as desired

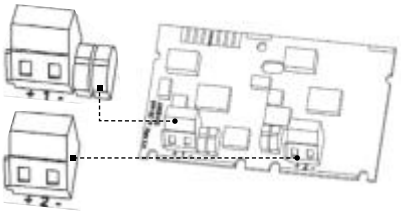
Default: last digit in display

6.5 Combined function module (IN/OUT)



The combined module is equipped with 2 inputs and 1 output.
The pulse input specification is the same as 6.3 above.
The pulse output specification is the same as pulse output 1 in 6.4 above, but not electrically isolated.

6.6 Analogue output function module



The module contains connections for 2 passive analogue outputs, which can be programmed as desired using the IZAR@SET software. The outputs are marked on the terminal strip as "1" and "2" with the respective polarity "+" and "-" and electrically isolated.

- Passive; external power supply: 10 to 30V DC
- Current loop: 4 to 20 mA where 4mA = 0 value; 20mA = programmed max. value
- Overload up to 20.5mA, then fault current
- Errors are generated at 3.5mA or 22.6mA (programmable)
- Output values: power, flow rate, temperatures

F96 Plus ultrasonic heat meter

6.7 Test output

The internal test output located on the side is intended for use by test centres.

The manufacturer provides two special cables for this:
1. Volume test pulses
2. Energy test pulses

Other specifications (pulse value, pulse duration/break, pulse frequency) can be obtained from the inspection and test instruction. Ensure that the temperature sensors (measuring resistors) are permanently connected when carrying out energy verification.

7. Display

To show the data generated by the integrator in the display, various windows are provided as loop functions that can be called up in succession to display the system information associated with each window (eg. energy amounts, water volume, running days, water amounts, current temperatures, maximum values). The energy meter has six different display loops:

The various display windows comprise of up to seven displays that change at intervals of between 2 and 4 seconds. The loops in the display are numbered from 1 to 6 to help the user find their way around quickly. The main loop is programmed with the current data as a default setting eg. for energy, volume and flow rate.

8. Simple operation

The push button is used to switch through the various displays. The button can be pressed for a short or long time. A short press of the button (‹3 seconds) switches to the next display within a loop and a long press (›3 seconds) switches to the next display loop.

The “Energy” window (sequence 1.1) in the main loop is the basic display. The meter automatically switches off the display to save power if the button is not pressed for approximately 4 minutes (except in the event of a fault) and returns to the basic display when the button is pressed again.

9. Error codes

The error code is displayed in the main loop if an error occurs. All the other windows can still be selected by pressing the button. The error code display appears again automatically if the button is not pressed for approximately 4 minutes.

The error display disappears automatically as soon as the cause of the error has been cleared. All errors present longer than 6 minutes are saved in the error log.

Main Loop (1)

Sequence	Window 1
1 1	Accumulated energy
1 2	Volume
1 3	Accumulated energy1
1 4	Flow rate
1 5	Power
1 6	Forward/Return temperature
1 7	Temperature Difference
1 8	Operating Days
1 9	Error Code
1 10	Display test

Accounting date loop (2)

Sequence	Window 1	Window 2
2 1	Accounting date 1	Accounting date 1 Energy
2 2	“Accd 1”	Future accounting date 1
2 3	Date 1 previous year	Date 1 previous year energy
2 7	Date 1	Puls output 1
2 8	Date 1 previous year	Puls input 1

Info loop (3)

Sequence	Window 1	Window 2
3 1	Current date	Current time
3 2	Secondary adress	0*
3 3	Primary adress 1	0*
3 4	Primary adress 2	22*
3 5	Place of installation	hot pipe*
3 6	Module Port 1	0*
3 7	Module Port 2	1*
3 8	Status of integrated radio (for instance “UHF On“)	
3 9	Software version	Checksum

Impulse loop (4)

Sequence	Window 1	Window 2	Window 3
4 1	Pulse input	Accumulated value pulse input 1	Pulse value 1
4 3	Pulse output	Accumulated value pulse output 1	Pulse value 1

Tariff loop (5) [1]

Sequence	Window 1	Window 2	Window 3
5 1	Tariff counter	Tariff type	Tariff limit
5 2	According Date	Tariff counter	“Accd 1A”

Monthly value loop (6)

Sequence	Window 1	Window 2	Window 3	Window 4	Window 5	Window 6
6 1	“LOG”	Date of last month	Energy	Tariff counter 1	Tariff counter 2	Volume
6 2	“LOG”	Date of month - 1	Energy	Tariff counter 1	Tariff counter 2	Volume
:	:	:	:	:	:	:
6 24	“LOG”	Date of month - 23	Energy	Tariff counter 1	Tariff counter 2	Volume

* Example [1] only heat meter with cooling tariff

Error display	Error description
C - 1	Basic parameter error in flash or RAM
E 1	Temperature range exceeds [-19.9 °C...199.9 °C] e.g. sensor short-circuit, sensor break
E 3**	Forward and return sensor reversed
E 4	Hardware error in ultrasonic measurement e.g. transducer or drive defective or short-circuit
E 5	Communication not possible (too frequent reading)
E 6**	Wrong direction of flow in volume measuring component
E 7	No meaningful ultrasonic receive signal e.g. air in the measuring path
E 8	No primary power supply (only if mains unit used), supply is via backup battery
E 9	Battery almost flat; calculated lifetime expired
E A*	Leakage: pipe break detected
E b*	Leakage: leakage detected in energy meter
E C*	Leakage: leakage pulse input 1
E d*	Leakage: leakage pulse input 2

* optional
** application-dependent

10. Declaration of conformity

Hydrometer Gmbh hereby declares that these products conform to the essential requirements of the following directives:
EMC Directive (2004/108/EC) R&TTE Directive (1995/5/EC)
MID Directive (2004/22/EC) DE-10-MI004-PTB013 DE-10-MI004-PTB003

The cooling meter is approved nationally in Germany (DE) under 22.72/10.03

More information is also available at **www.diehl-metering.de**

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